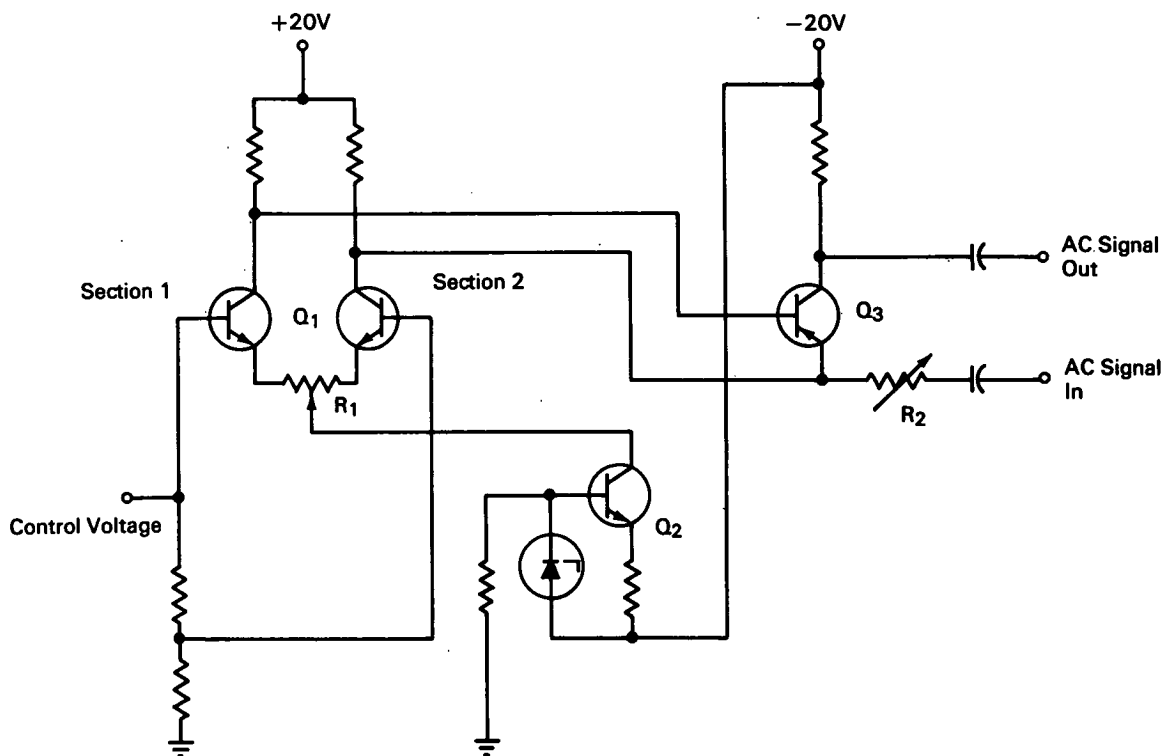


NASA TECH BRIEF



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Solid State Circuit Switches AC Load



The problem:

To design a solid state circuit that will switch ac signals with peak amplitudes greater than 5 volts. Prior art devices have been able to control dc voltages only.

The solution:

A differential amplifier circuit that biases a switching transistor on and off by a 0.1 to 5.0 dc control voltage.

How it's done:

The circuit consists of a dual NPN transistor, Q_1 , a current source, Q_2 , and an ac switch, Q_3 . Resistors R_1 and R_2 are initially adjusted to obtain proper switching action and to control the ac gain of the switch. With no dc control voltage applied, the collectors of Q_1 will essentially be at the supply potential of 20 vdc causing the base and emitter of the switch Q_3 to be at this same potential. In this condition, Q_3 will not conduct and there will be no ac signal out.

(continued overleaf)

Applying a dc control voltage of 0.1 to 5.0 volts to the base of section 1 of Q_1 , causes that section to conduct more heavily than section 2. Thus, the collector of section 1 will be at a lower voltage than the collector of section 2, causing Q_3 to be forward biased to conduct and pass the ac signal.

Notes:

1. Transistor Q_2 provides a constant current source for Q_1 for more stable operation. Resistor R_1 determines the on/off sensitivity of Q_3 by unbalancing Q_1 . Resistor R_2 is the signal gain potentiometer and is adjusted for unity gain so that 1 volt of input signal produces 1 volt of output signal.

2. Output of this switch is flat within 3 db from 6 cycles to 21.5 kc using 1 mfd coupling capacitors.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B66-10465

Patent status:

No patent action is contemplated by NASA.

Source: Carl P. Chapman and Donald R. Rupnik
(JPL-798)